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Immigration and the Growing Canada-U.S. Productivity Gap

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Abstract:
This paper examines the impact of immigration on labour productivity in Canada. Immigration is a factor that has been largely ignored in the literature on Canadian productivity growth. A simplified growth accounting approach is utilized to estimate the reduction in labour productivity in Canada (as measured by GDP per worker) that can be attributed to the poor performance of post-1990 cohorts of immigrants in the labour market (as measured by average earnings as reported in the 2006 census). It is estimated that immigration accounts for 2.23 percentage points, or about a fifth, of the 10.96 percentage point post-1990 increase in the Canada-US labour productivity gap.

JEL Classification Codes: J24 – Human Capital; Skills; Occupational Choice; Labor Productivity; O47 – Measurement of Economic Growth; Aggregate Productivity; Cross-Country Output Convergence

Keywords: productivity, recent immigrants to Canada, immigration policy, immigrant labour, human capital

Introduction

Productivity has become a central focus of Canadian public policy discussions. Immigration is often said to be necessary to raise productivity and to enable Canada to compete successfully internationally. The exact mechanism involved is usually not stated other than through favourable reference to the benefits of immigration in opening Canada to new ideas and markets. And indeed, it must be admitted that there are many very prominent people who came to Canada as immigrants and who have made major contributions to the development of the economy. On the other hand, Robert Putnam has recently apologetically raised the possibility that immigration reduces social solidarity and social capital (Putnam, 2007, p.137). And it should be evident that this could undermine productivity as social capital contributes to human capital, which along with physical capital, are factors of production. These impacts, however, as important as they may be, cannot be easily quantified and productivity research has thus tended to focus on that can be more readily measured.

This paper reviews some of the key facts about productivity. And it notes that immigration is never mentioned as a factor tending to depress productivity. It then goes on to apply the methodology of growth accounting to calculate an estimate of the impact of recent immigration on productivity. This in turn calls into question the wisdom of the Government's immigration policies as part of any evidenced-based strategy to improve the living standards of Canadians.

The Importance of Productivity

Productivity is considered to be very important by economists. As Andrew Sharpe (2010, p.10), an economist who has long studied the issue, wrote in a recent survey of Canada's weak productivity performance:

> Productivity is by far the most important driver of living standards for Canadians. This is because real income can only increase in the long run if more real output is produced… While increased productivity growth is generally associated with higher wages, it also brings to life a new world of possibilities for Canadians. Higher productivity means that Canadians will be able to meet the fiscal pressures associated with an aging population. It means the possibility of more health care funding. It means that workers will have the option of benefiting from increased leisure. In short, productivity growth is vital to the economic success of Canadians.

The Canada-US Productivity Gap

Productivity growth in Canada has increasingly been falling behind that in the United States. While GDP per worker in current US dollars is not the best measure of productivity as it incorporates inflation as well as real increase in output, it is often used for purposes of comparison. By this measure, the productivity gap between Canada and the United States, after remaining relatively stable for decades up to 1983, began to rise significantly thereafter with the increase accelerating after 2000 (Chart 1).

While a number of factors have been adduced to explain the growing Canada-US productivity gap, Sharpe (2010, p.14) observes that "Diverging productivity trends in Canada and the United States are even more puzzling given the similarity of output growth trends." His conclusion is

that:

> There exists no consensus on the reasons for the weak productivity performance of the Canadian economy since 2000. While many studies have attempted to identify the effect on productivity in Canada of a host of microeconomic and macroeconomic factors, far fewer studies have focused specifically on the recent productivity performance of Canada.

The growing gap between productivity in Canada and the United States has broad implications for Canada's ability to compete in increasingly competitive international markets and for Canadian living standards. Indeed it has been a major source of concern among policy makers in Canada for many years.

In spite of all the recent attention on Canada's relatively slow productivity growth, the important issue of the implications of the poor labour market performance of recent cohorts of immigrants for productivity growth has yet to be analyzed and quantified as a possible factor.[1]

This paper seeks to remedy this deficiency and to present a preliminary estimate of the magnitude of the possible impact of immigration on productivity using a standard tool in the economist's toolbox.

The Theory of Growth Accounting

The tool is the standard growth accounting model popularized by Edward Denison (1962; 1979) and used by the Macdonald Royal Commission on the Economy in Canada (Royal Commission, 1985). It is a theoretical framework that readily lends itself to analyzing the impact of immigration on productivity. Based on the Swan–Solow theory of economic growth (Swan, 1956; Solow, 1956), growth accounting decomposes the sources of output growth amongst the various factors of production using a standard Cobb-Douglas production function.[2] This approach can be adapted to incorporate any number of factor inputs including capital, energy, and labour. Total factor productivity is measured as a residual after the contributions of all other inputs are accounted for. The contribution to output of different kinds of labour can be estimated using relative wage (or earnings) weights reflecting the productivity of different types of labour.[3] This is based on the neoclassical assumption that wages (or earnings) are determined by the

[1] Nakamura, Nakamura and Diewert (2003) presented a framework for analyzing the potential impact of immigration on productivity. While they reviewed the data on the poor earnings performance of recent immigrants from the 1991 and 1996 censuses, which is the raw material of any estimate, they did not go the next step and use the data to produce an estimate of the impact of immigration on productivity.

[2] $Y=AK^{\alpha}L^{\beta}$ where Y is output, K is capital, L is labour and α and β are capital and labour's share respectively. This production function has the convenient property of being linear in the logarithms of output, capital and labour, which can be interpreted in terms of percentage changes.

[3] The Macdonald Commission (1985) used this technique to estimate the impact on economic growth of changes in the composition of labour. Specifically, it focused on the age-sex mix of the labour force, education and inter-industry employment shifts. In addition, Nakamura, Nakamura, and Diewert (2003, p.28) concluded that their "analysis suggests that the use of a wage weighted aggregate for the labour input of workers of different types rather than a simple sum of hours of work will be an improvement for considering the impact of immigrants on the productivity of the nation."

marginal productivity of labour and reflect the contribution of the worker to output.

An Estimate of the Contribution of Immigration to the Growing Canada-U.S. Productivity Gap

The methodology of growth accounting is used in Table 1 to estimate the decline in labour productivity that can be attributed to the poor labour market performance of the post 1990 immigrant cohorts. An understanding of the basis of the estimate can best be understood by going through the table in detail line by line.

Lines 2 to 4 shows the total number of new immigrants who came to Canada over the 1991-95, 1996-2000 and 2001-04 periods as reported by Citizenship and Immigration Canada. Line 5 column 3 provides an estimate of the number of immigrants that came between 2005 and 2010. It takes the actual numbers for 2005-09 and adds an estimate of 260,000 for 2010 based on the Minister's statement that the number for this year would be at the upper end of the 240,000 to 265,000 range given earlier (Citizenship and Immigration Canada, 2010, p.3). It is noteworthy that over the twenty years from 1991 to 2010 about 4.7 million immigrants were admitted to Canada (line 6 column 3). This represents 13.7 per cent of the Canadian population of 34.1 million as of July 1, 2010 (line 7 column 3).

Lines 9 to 11 show the show the number in the various post-1990 cohorts of new immigrants who have employment income as reported in the 2006 Census. This is a proxy for employment, which is higher than employment from the labour force survey as it incorporates everyone who had employment income any time during the year even if they did experience unemployment over the course of the year. Line 12 provides an estimate of the number of immigrants entering the country between 2005 and 2010 with employment income in 2010. It is made assuming that the same increase exhibited in the administrative data between the 2001-2004 and 2005-2010 cohorts also applies to the census data (line 11 column 3 times line 5 column 3/line 4 column 3).

Line 13 column 3 shows that 2,359,575 new immigrants from the four cohorts are estimated to earn employment income in 2010. Line 14 provides an estimate of the total number with employment income in 2010. And line 15 shows the number with employment income excluding the four cohorts of new immigrants. This is the total that provides the most relevant base for measuring the increase in employment resulting from post-1990 immigration.

Lines 17 to 20 column 3 shows number of new immigrants in the four cohorts of new immigrants with employment income as a percentage of the total population with employment income as well as the total for the four cohorts of new immigrants. In total, the four cohorts of new immigrants account for 12.58 per cent (line 21 column 3) of the total excluding themselves (line 15 column 3).

Lines 23 to 25 column 2 display the average employment income of the three cohorts of new immigrants in 2005 as reported in the 2006 census. Line 26 column 2 shows the average employment income of the non-immigrant population in the same year. Lines 28 to 30 column 2 show average employment income for each of the three cohorts as a percentage of the total average employment income of the non-immigrant population calculated by dividing lines 23 to 25 by line 26. It is assumed that these same proportions will hold over the 2005 to 2010 period

(lines 28 to 30 column 3) and that the same proportion 65.72 as experienced by the 2001-04 cohort in 2005 will apply to the 2005-10 cohort in 2010 (line 31 column 3).

It is worth noting that the employment income of the different cohorts of new immigrants ranges from 16.25 to 34.28 per cent lower than that of the non-immigrant population. This provides a measure of the relatively lower productivity of new immigrants that is used to calculate the overall reduction in productivity resulting from post-1990 immigration. More precisely, this is done by applying the gaps in employment earnings to the product of labour's share (estimated to be 67 per cent) and the number of new immigrants with employment income as a percentage of the non-immigrant population with employment income. This yields lines 33 to 36 column 3, which are the estimates of the overall reduction in productivity resulting from the poor labour market performance of recent cohorts of immigrants.

According to the analysis presented in Table 1, the decline in the productivity of labour as measured by GDP per worker over the whole 20-year period from the four post 1990 cohorts of new immigrants was 2.23 per cent and growing over time. While this may only amounts to about a tenth of a percent lower growth per year, the small annual reduction adds up to a relatively significant decrease by the end of the period and ends up accounting for over 20 percent of the 10.98-per-cent increase in the Canada-U.S. gap in GDP per worker recorded between 1990 and 2009. This is, of course, not to deny that the deterioration could have been even greater if there had not been a similar deterioration over the same period in the labour market performance of new immigrants to the United States, many of whom were illegal and had not completed secondary school. And it doesn't say anything about the impact of the many other factors affecting productivity that have been identified by others and that have both increased, but most reduced, Canadian productivity, and can be used to explain the remaining 80 per cent of the increase in the productivity gap.

The 2006 census data revealing the poor labour market performance of recent cohorts of immigrants are cause for concern, especially when combined with the continued high level of immigration after 2005, which is planned to persist indefinitely in the future. Growth accounting suggests that immigration will continue to have a large and growing negative impact on labour productivity, which will only cease when the immigrants that are selected and admitted are able to earn at least as much as non-immigrants. Given that the largest proportion of immigrants are not selected based on their skills, but rather are dependents of economic class immigrants, family class immigrants or refugees, it doesn't appear likely that new immigrants will earn as much on average as non-immigrants in the foreseeable future. Thus immigration can be expected to exert a continued depressing effect on productivity.

As an aside, it will unfortunately no longer be possible to monitor the impact of immigration on productivity using the census as the data on the earnings of immigrants utilized in this paper comes from the census long form which is being eliminated in the 2011 census. But, at least for the present, the data from the 2006 census provides a clear indication that from an economic point of view Canada's immigration program has lowered productivity growth and has contributed significantly to the growing productivity gap with the United States.

Other Possible Negative Impacts on Productivity from Immigration

It is worth mentioning here that there are other possible negative impacts that the high recent levels of immigration could be having on immigration that have not been taken into account. One stems from the depressing impact that the increased labour supply resulting from large inflows of immigrant labour can be expected to have on wages. It must be admitted that wage growth in Canada has been very weak for the last 20 years. And lower wages lead to substitution of labour for capital and other factors of production and in general lead to a greater number of workers being employed. Martin Collacott (2003, p.25) noted that U.S. studies have shown the availability of cheap labour has made industry less willing to invest in labour-saving technologies and that the same thing could be happening in Canada. This would increase the denominator of the GDP per worker relationship lowering this particular measure of productivity. Unfortunately, the estimation of the impact of wages on the demand for labour is extremely complicated, involving the estimation of sophisticated econometric relationships, and is thus inherently somewhat subjective. Thus, for the present, it will have to suffice to merely raise this particular possible cause of slow productivity growth as a candidate for future research.

Another possible negative impact of immigration on productivity is that, at least in the short run, it decreases the amount of capital available for each worker to work with and lower the capital intensity of the economy. Rao, Tang and Wang (2003, p.31) attributed 12 percent of the Canada-U.S. labour productivity gap in the business sector in 2000 to the lower intensity of capital. In a later paper (Rao, Tang and Wang, 2004, p.5), they revised their estimate up and attributed 30 percent of the gap in 2001 to the same factor. The important thing about these studies is not the precise values of their estimates, but that they indicate that Canada lacks capital relative to the United States. Such a lack can only be exacerbated by a high level of immigration as most immigrants do not bring with them all the capital that will be needed to employ them productively.

And Don DeVoretz (1999, pp.18-24) has raised the possibility that the influx of highly skilled immigrants to Canada has accelerated the outflow of Canadian workers who were even more highly skilled by keeping wages low. This too could have an adverse impact on productivity.

Possible Positive Impacts on Productivity from Immigration

In addition to the possible opening up of Canada to new ideas and markets, there are other arguments that have been made that immigration can raise productivity. But the empirical analysis supporting these arguments has been done with respect to the United States. In particular, Peri (2009) analyzes state-by-state data to show that immigration raises productivity and income per worker. The main mechanism through which this works is that lower wage immigrants take manual-skill jobs and push native workers into better paying communication-intensive jobs utilizing their superior language skills. The functioning of this process of task specialization, which Peri argues explains half to two-thirds of the increase in productivity, is further explored in Peri and Sparber (2009). A necessary condition for such a positive impact to occur is that immigrant labour has to be complementary to domestic labour in production. But even if Peri's analysis were valid for the United States (and there are grounds for skepticism), it is unlikely to apply in Canada where a much larger proportion of immigrants are selected on the

basis of skills and education.

The Government's Plan to Increase Growth and Prosperity

The previous government published a discussion paper in the fall of 2005 entitled *A Plan for Growth and Prosperity*, which acknowledges at the outset that "future increases in our standard of living will depend in large measure on further improvements in the productivity of our economy." (Department of Finance Canada, 2005, p.7). The plan, which is still being pursued by the current government, involves efforts to: improve the efficiency and effectiveness of our immigration system; increase immigration of skilled and educated workers; and improve immigrant integration (*Ibid.*, p.82). The underlying assumption is that it is possible to increase the immigration of skilled and educated workers to maintain labour force growth (*Ibid.*, p.69).

The fly in the ointment is that only 17 per cent of immigrants are actually selected under the skilled worker program and that they bring with them or sponsor family members who do not have the same level of skills and who usually perform worse in the labour market. To actually increase productivity, immigrants have to be more productive than existing workers in Canada, which, given that earnings reflect productivity, means that they must earn more than existing workers. If the Government were to only admit such immigrants, it could justifiably claim that immigration policy was productivity enhancing. However, Since there is no indication that the Government only intends to admit immigrants likely to achieve a higher than average level of earnings,there is no way that the government's proposed immigration policy can conceivably be portrayed as helping to lower the Canada-U.S. labour productivity gap.

A Final Word

Don't believe anyone when they tell you that immigration is raising productivity or that it is likely to reduce the Canada-U.S. productivity gap. A careful analysis of the data using the standard analytical tool of growth accounting in the most simple and straightforward way possible shows that this just isn't true. As the American humorist who called himself Artemus Ward said, "It ain't so much the things we don't know that get us in trouble. It's the things we know that ain't so."

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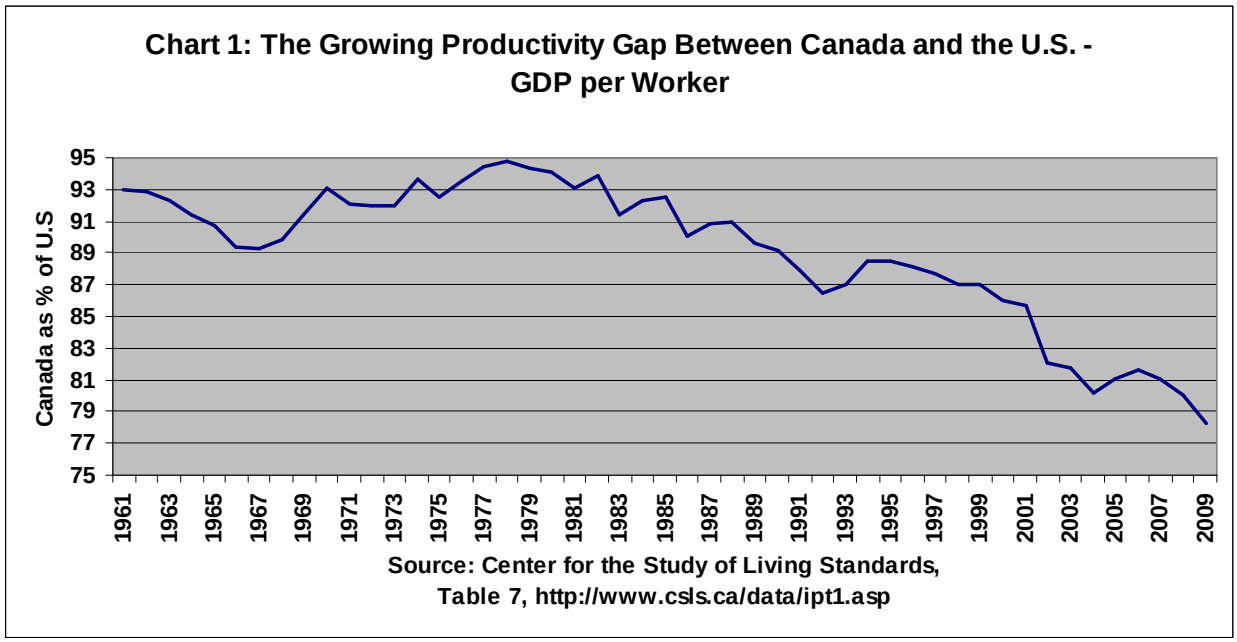
Chart 1: The Growing Productivity Gap Between Canada and the U.S. - GDP per Worker
Canada as % of U.S
95
93
91
89
87
85
83
81
79
77
75
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
Source: Center for the Study of Living Standards, Table 7, http://www.csls.ca/data/ipt1.asp

Table 1: Estimate of Decline in Overall Productivity Resulting from Poor Labour Market Performance of Post 1990 Immigrant Cohorts

	2001-04	2005-10 Est.
1. Total Number of New Immigrants from CIC Adminstrative Data		
2. Cohort of 1991-95	1,181,565	1,181,565
3. Cohort of 1996-2000	1,033,716	1,033,716
4. Cohort of 2001-04	936,862	936,862
5. Cohort of 2005-10 (Est. for 2010)		1,510,063
6. Total for Cohorts from 1991-2010	3,152,143	4,662,206
7. Total Population end of period July 2005 and 2010	32,359,000	34,108,752
8. Estimate of Number of New Immigrants with Employment Income		
9. Cohort of 1991-95	573,995	573,995
10. Cohort of 1996-2000	548,800	548,800
11. Cohort of 2001-04	473,530	473,530
12. Cohort of 2005-10 (Est.based on 2001-04 Cohort)		763,250
13. Total for Cohorts from 1991-2010	1,596,325	2,359,575
14. Estimate of Total Number with Employment Income	18,201,265	21,113,065
15. Estimate of Total Number with Employment Inc. ex. Cohorts 1991-2010	16,604,940	18,753,490
16. Number of New Immigrants with Employment Income as per cent of Total Employment ex. Cohorts 1991-2010		
17. Cohort of 1991-95	3.46	3.06
18. Cohort of 1996-2000	3.31	2.93
19. Cohort of 2001-04	2.85	2.53
20. Cohort of 2005-10 (Est.)		4.07
21. Total for Cohorts from 1991-2010	9.61	12.58
22. Average Employment Income		
23. Cohort of 1991-95	30,534	
24. Cohort of 1996-2000	29,272	
25. Cohort of 2001-04	23,961	
26. Average Employment Income of Non-immigrant Population	36,457	
27. Employment Income of Immigrant Cohorts as per cent of Non-immigrant Population in First Year of Period		
28. Cohort of 1991-95	83.75	83.75
29. Cohort of 1996-2000	80.29	80.29
30. Cohort of 2001-04	65.72	65.72
31. Cohort of 2005-10		65.72
32. Estimate of Percentage Reduction in Productivity		
33. Cohort of 1991-95	0.38	0.33
34. Cohort of 1996-2000	0.44	0.39
35. Cohort of 2001-04	0.65	0.58
36. Cohort of 2005-10		0.93
37. Total for Cohorts from 1991-2010	**1.47**	**2.23**

Notes: Employment Income ratios from Census Data are assumed to stay at 2001-04 levels in 2005-10. The total population with employment income for 2005-10 is assumed to grow at same rate as employment from the labour force survey from the 2005 level.

Source: The Citizenship and Immigration Canada administrative data on landings can be found at: http://www.cic.gc.ca/english/resources/statistics/facts2009/permanent/01.asp.

The 2006 Census data is at:

http://www12.statcan.gc.ca/census-recensement/2006/dp-pd/tbt/Rp-eng.cfm?TABID=1&LANG=E&APATH=3&DETAIL=0&DIM=0&FL=A&FREE=0&GC=01&GK=1&GRP=1&PID=96279&PRID=0&PTYPE=88971,97154&S=0&SHOWALL=0&SUB=0&Temporal=2006&THEME=81&VID=0&VNAMEE=&VNAMEF= .